RISK FACTORS FOR SEPARATION ANXIETY IN DOGS

by

KIMBERLY DENISE BROWN

(Under the Direction of Sharon Crowell-Davis)

ABSTRACT

Understanding the risk factors for separation anxiety is important to understanding why dogs have this problem and can help in understanding how to prevent and treat the problem. We conducted a survey of potential risk factors for separation anxiety. The survey was completed by 202 dog owners. Of the 202 surveys, 63 of these dogs had separation anxiety and 130 did not. This study was done with an owner directed survey that asked questions about the dog's background and current behaviors. In this study we hypothesized the effect of 12 risk factors for separation anxiety. These risk factors include, but are not limited to, source of dog, time left alone, type of dog and time spent exercising. The results of the surveys found that the source of dog had a high impact on incidence of separation anxiety.

INDEX WORDS: dogs, separation anxiety, shelters, and risk factors

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DEDICATION

To my family, friends and my boyfriend David, you all played an important role in the process of writing this paper. Thank you for helping me along the way.

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CHAPTER 1

INTRODUCTION

Undesirable behaviors are common problems in the domestic dog population. These so-called behavioral problems are risk factors for relinquishment of dogs to an animal shelter and can pose problems in the field of animal welfare (Martinez et al. 2011). Separation anxiety affects an estimated 17% of dogs in the United States (Neilson 2011). The most common symptoms of separation anxiety include inappropriate elimination in an otherwise house trained dog, excessive vocalization and destructiveness (Overall et al. 2001). These behaviors are also some of the most commonly cited reasons for relinquishment to shelters (Marston and Bennett 2003).

Each year, millions of unwanted dogs arrive in animal shelters after abandonment, abuse or relinquishment by their previous owners (Dowling-Guyer et al. 2011). Of the dogs that are adopted from shelters 20% are re-relinquished by their new owners because of behavior problems, some of which the dogs had before they were adopted, and a large proportion of these dogs are later euthanized (Marston and Bennett 2003). Some of the risk factors for separation anxiety include pathologic over-attachment to the owner in combination with underlying anxiety, aversive early experiences such as too early separation from the mother, a traumatic experience while alone, and a change in family circumstance (Flannigan and Dodman 2001).

Behavioral tendencies, or behavioral traits, reflect a consistent pattern of behaviors exhibited in similar situations and are driven, at least in part, by personality (Dowling-

Guyer et al. 2011). A number of conditions have been identified as being at least partly inherited in of a number of breeds including, but not restricted to, generalized anxiety/fear, noise phobia, impulse/control aggression, conspecific aggression, predatory aggression and obsessive-compulsive disorder (Overall et al. 2006). This shows that there is a genetic component to some of the behavioral problems seen in dogs today. One contributing factor is that the breeders selections are aimed more at improving morphological than temperament traits of dogs (Valsecchi et al. 2010). When breeders breed for specific physical traits they do not necessarily consider the behavioral issues, if any, that go along with those particular physical traits.

It is important to understand why dogs have behavior problems so that veterinarians can educate pet owners on what to look for and how to deal with these behavior problems. We also need to learn why they have the problem behaviors so we can develop new and improved treatments for these problems and educate pet owners on how to treat them so that fewer dogs are surrendered to shelters each year. The main objective of this thesis was to look at risk factors for separation anxiety so that in the future fewer dogs will be relinquished, euthanized or re-homed because of this behavioral disorder.

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CHAPTER 2

LITERATURE REVIEW

History of the Dog:

The wolf (*Canis lupus*) is considered to be the sole ancestor of the dog (Gacsi et al. 2005). From as early as the Middle Pleistocene period, the bones of wolves have been found in association with those of early hominids (Clutton-Brock 1995). Some of these early wolves were probably around humans so much that they became tamer and these are the wolves that became the early predecessors to the domestic dog. These wolves would remain with the humans and breed with other tamed wolves (Clutton-Brock 1995). There was likely more intense selection for dogs of smaller size and with behaviors, such as docility, that allowed for close contact with humans (Wayne and vonHoldt 2012). The main physical difference between wolves and dogs are the result of a reduction in head, brain and tooth size (Coppinger and Schneider 1995).

Neoteny may have played an important role in creating an organism suitable for domestication. Neoteny is the evolutionary process whereby an animal retains its youthful or juvenile characters as an adult (Coppinger and Schneider 1995). Dogs, even in their adult stages, resemble the juvenile stages of their wild ancestors the wolves. Even though there are many different breeds of dog and they range in sizes from giant breeds to toy breeds, these dogs are very similar to each other in general shape. Eliminating size as a factor, most breeds have a consistent and predictable design (Coppinger and Schneider 1995). This means that even though the breeds may look very

different they all have a very similar basic structure. They all have the same basic skeletal system, muscular system and cardiovascular system. Their main difference is in the proportions and size. An example of the differences in size and proportions is the Basset Hound, which has proportionately short legs but a long body, whereas a Great Dane has proportionately long legs and a shorter body, as well as being larger in overall body size.

Domestication and Socialization of Dogs:

Dogs have developed a special relationship with humans and have established a niche for themselves in human society (Nagasawa et al. 2009). Domestication is generally viewed as an evolutionary process controlled by human influence (Topal et al. 2005). Topal's domestication hypothesis claims that there could have been specific genetic changes in the attachment behavior organizing system that have emerged as the result of selective breeding for dependency on and attachment to humans (Topal et al. 2005).

Hare's domestication hypothesis states that dogs should be more skillful at reading visual cues from humans than wolves, and that variations in experience with humans should not affect the performance of either species. It also states that, past a certain age, dog puppies should be as skillful as older dogs in identifying human visual cues (Hare et al. 2002). In one test conducted by Hare, food was hidden under bowls and the humans would perform a variety of visual cues, such as pointing and gazing, to hint where the food was. The dogs performed better than the wolves in this task. In the second test both dogs and wolves saw where the food was hidden but there was a time delay before they were brought to the location. Both dogs and wolves preformed equally on this test. Hare found, in his study with wolves and dogs, the strongest support for the

domestication hypothesis i.e. that dog's social-communicative skills with humans were acquired during the process of domestication (Hare et al. 2002). Wolves did not perform as well as dogs in the human signaling tests but they did perform just as well on the nonsocial food finding experiments as the dogs did. The dogs may have preformed much better on the human signaling tests because dogs have been domesticated so much that they have learned how to interpret non-verbal signals by humans. Domestic dogs are around humans from the time they are born, unless born as a stray. The dog has a long history of adaptation to the human environment and it is widely assumed that the selection process during domestication may have altered not only their morphological traits but also their behavior and behavior control systems (Topal et al. 2005).

The socialization period is the period when the formation of primary social relationships or social attachments happens (Serpell and Jagoe 1995). This period, in wolves, runs from about second to the sixth week after birth (Lord 2013). The socialization period in dogs runs from about the third to the twelfth week after birth, with the peak sensitivity period being between six and eight weeks. The 6-8 week mark is thought by some to be the optimal time to take the puppies away from the mother and littermates because of this peak in sensitivity to novel situations (Serpell and Jagoe 1995). The socialization period is also the period when puppies learn how to handle stressful situations, such as meeting new dogs, going to novel environments and thunder storms. The latter half of the socialization period, and possibly later, plays a major part in determining which fears are acquired and how strongly they are expressed in adult life (Serpell and Jagoe 1995). If puppies are exposed to different things during this sensitive

period then they are better able to remain calm when exposed to novel stimuli than if they experience these situations after the socialization period (Udell et al. 2010).

Anxiety and Attachment in Dogs:

Behavior problems related to fear and anxiety are common in the domestic dog. These problems include separation anxiety, noise phobias and fear-related aggression (Dreschel 2010). A physiological stress response occurs following exposure to a fear or anxiety provoking stimulus (Dreschel 2010). Stress can be divided into two main categories: Eustress and negative stress. Negative stress is also called distress or overstress. Eustress indicates that the effort the animal makes to adapt to the environment is within the limits of normality (Mariti et al. 2012). Examples of eustress include a dog trying to adjust to a new home after adoption and a dog seeking shade to rest in on a warm day. The terms overstress and distress are used when the amount of effort and energy required to adapt to the stressor occurs only to the detriment of other important biological functions (e.g., growth and reproduction) of which the animal may or may not be aware (Mariti et al. 2012). An example of this would be a dog that cannot reproduce anymore because normal physiological and endocrine function have been altered due to the stress of a new environment or being taken away from its original owners. An example of distress would be the dog having such severe anxiety about the owner leaving the home that it shakes violently, and will not eat or rest until the owner returns. There are many things/events that can cause stress in dogs: e.g. being surrendered to a shelter, being abandoned on the side of the road, being adopted and adjusting to a new home and moving to a new home even if the dog is with the original owner and storms.

Dogs that have spent time in a shelter at any point in their life are prone to anxiety related behavior problems (Marston and Bennett 2003). There are a number of stressors within the shelter environment that can have an effect on the dog. These stressors include; high levels of noise, exposure to novelty, isolation from previous attachment figures, prolonged confinement and reduced interaction with conspecifics and humans (Marston and Bennett 2003). Exposure to excessive novelty, prolonged confinement and reduced interaction between conspecifics can have very serious effects on puppies if they are exposed to these things during the socialization period. This can keep them from learning to form social bonds with humans and/or other dogs (Marston and Bennett 2003, Serpell and Jagoe 1995).

Attachment relationships are a necessary component of living in a social group, helping to keep group members together (Parthasarathy and Crowell-Davis 2006). For social animals the group has a survival function because being alone can be dangerous (Konok et al. 2011). Wolves are a social species that live and travel in packs; dogs are a close relative to wolves and are also a social species (Jenks 2011). This explains why dogs attach to their owner or other animals in the household. Attachment develops rapidly: in one study, a short period of interaction with humans i.e. 3 separate visits lasting 10 minutes each, evoked attachment behavior towards the handler in adult dogs that had been deprived of human contact, i.e. shelter dogs. The dogs differentiated between their handler and a stranger in the same way as adult pet dogs differentiate between their owner and a stranger (Topal et al. 2005). This demonstrates that it does not take long for a dog to form an attachment bond with a person, a fact which is important when investigating separation anxiety. Since a dog can attach quickly to a person, they

can also have anxiety when that person leaves, which can explain why dogs that have recently been adopted may exhibit separation anxiety when their new owner leaves.

Separation Anxiety in Dogs:

By definition, separation anxiety is severe distress experienced when an individual is distanced from other group members, but in canine behavioral terminology this term is most often used for dogs that exhibit a distress response when separated from their owner (Flannigan and Dodman 2001). Signs of separation anxiety include, but are not limited to, urination or defecation, in an otherwise house trained dog, destructiveness, vocalization, excessive salivation, pacing, panting, and self-inflicted trauma (Sherman 2008, Flannigan and Dodman 2001, Overall et al. 2001). Whining, barking, house-soiling and destructiveness during the owner's absence are the most commonly-cited symptoms of separation anxiety and are common reasons for relinquishing dogs to animal shelters (Butler et al. 2011). They are probably the most commonly cited because they are the easiest to recognize. Whining and barking may be reported by a neighbor, but the house soiling and destructiveness are easily seen upon arrival home. In contrast, the neighbor will not be aware of trembling, and for dogs that tremble, this behavior generally stops by the time the owners enter the house and see the dog. It has been hypothesized that separation anxiety in dogs is derived from over attachment to or over-dependency on the owner with underlying anxiety (Takeuchi 2000). Dogs with separation anxiety can be strongly attached to a person or have a strong desire to be with their owner such that when this proximity is not possible anxiety can ensue (Ibanez and Anzola 2009). This leads to unwanted or undesirable behaviors occurring, which can be

detrimental to the owner-dog bond. If dogs start to display undesirable or unwanted behaviors, the owners are more likely to surrender the dogs to shelters or fosters.

Other theories on the causes of separation anxiety in dogs include: early separation from the mother, traumatic experiences when left alone, change in family circumstances, and genetic predisposition for separation anxiety (Flannigan and Dodman 2001). Traumatic experiences can include but are not limited to abuse, being relinquished to a shelter, the process of re-homing and changes to the household. Restrictive housing, such as exists at most shelters, has been found to be a stressor for dogs (Marston and Bennett 2003). One study found that crossbred dogs had a higher incidence of separation anxiety than did pure bred dogs (Serpell and Jagoe 1995). Adjusting to living in a shelter can be considered a traumatic experience for the dog. This could explain reports that crossbreed dogs, i.e. mixed breed dogs, have a higher incidence of separation anxiety. In one study on dogs with separation anxiety three of the dogs experienced very traumatic events during separation. One dog was left in a car for 4 hours, the second was left in a bathroom that flooded with hot water and the third was tied up in a laundry room for two weeks while the owner(s) were away (Butler et al. 2011). These traumatic events could very well be the reasons why these dogs developed separation anxiety.

Significant social changes in the home, such as a new family member or change in owner work schedule, have been identified as a weak risk factor for separation anxiety (Neilson 2011). This can change the routine of the house and can cause stress to the dog. A behavioral response is often the most efficient option to resolve the stressful situation, permitting the organism to regain homeostasis (Mariti et al. 2012). The behavioral

response to these changes can include behaviors associated with separation anxiety. Another change to the household can include the death of someone in or close to the household. Anxiety reactions may also be exacerbated by the moods of a dog's human caregivers, who may be mourning the death of a person or pet (Schwartz 2003). Therefore the dogs can be depressed even if the person was never in the household, i.e. the dog did not previously have an attachment to the dead human but can still feel distress.

An estimated 17% of dogs in the United States suffer from separation anxiety. This equates to almost 10 million dogs. Less than a million of these dogs are receiving care for their separation anxiety (Neilson 2011). That means that roughly 9 million dogs are suffering from a treatable disorder and a large number of these dogs may be relinquished to a shelter or re-homed privately. In 2008 Barbara Sherman stated that separation anxiety is diagnosed in about 20-40% of dogs that present to specialty behavior clinics in the US. Because separation anxiety is such a common problem more research needs to be done on the risk factors for separation anxiety and ways to correct the problem or prevent the problem from happening in the first place. These factors are important to understand so veterinarians and behaviorists can help people to understand why dogs have the behavior problems they have and how to correct these problems. Veterinarians need to be able to better educate clients on what separation anxiety is and how to deal with it to decrease the number of dogs surrendered to shelters each year. Understanding risk factors for separation anxiety can also help veterinarians give people appropriate advice before they adopt or obtain a new pet.

Each year, millions of unwanted dogs arrive in animal shelters after abandonment, abuse or relinquishment by their previous owners (Dowling-Guyer et al. 2001). Dogs that have been re-homed either via shelter, humane society or because they became a stray, have been reported as exhibiting more anxiety issues than dogs obtained from breeders (Fuh et al. 2012, McGreevy and Masters 2008). In one study, obtaining a dog from a shelter resulted in a higher probability of separation anxiety than for dogs obtained from sources such as breeder, pet store, friend or family member (Neilson 2011). Tuber reported that about 20% of the populations of dogs in shelters are dogs that have been relinquished and then re-relinquished (Tuber et al. 1999). These dogs tend to have more problems coping once they enter a new home (Fuh 2012). They can form a new attachment to the owner but may feel an increased sense of anxiety when the owner leaves each day. This can lead to more behavior problems and then a possible repetition of re-homing if the behaviors are not corrected. Previous studies have shown that all dogs acquired when older than 6 months of age are at increased risk of separation anxiety, with the greatest risk of relinquishment occurring when the dogs are initially acquired when aged 1-2 years (Marston and Bennett 2003). Older dogs also more often come from shelters, instead of breeders or pet shops (Martinez et al. 2011). Older dogs may not have been properly socialized as puppies if they were in shelters, and are subsequently not able to cope with novel situations. This would make older dogs more prone to separation anxiety induced behaviors.

Also, when an owner surrenders their pet to a shelter they are not always honest about the reason they are surrendering their pet. Some people feel that if they are 100% honest then the dog will not get a new home and will be euthanized (Marston and Bennett

2003). The owners still care about the welfare of their dog even though they can no longer take care of the dog, and ultimately want the dog to go to a new home. If they feel that the dog will not get adopted if people think the dog has a behavior problem then they may choose to omit that information when surrendering the dog to give it the best possible chance at a new home. Therefore, when a new owner adopts the dog they are adopting a dog with an unknown behavior problem and they are not prepared to take on that responsibility. This also leads to re-relinquishment of dogs because the owners were not prepared to deal with the existing, but unknown problem (Marston and Bennett 2003). If someone adopts a dog and they are not aware that the dog has a behavior problem they may be less likely to keep the dog and work on fixing the problem; they may just take the dog back to the shelter because they are overwhelmed by the situation or because they do not have time to deal with the problem at hand.

A number of conditions have been identified as being at least partially inherited in a number of breeds including, but not restricted to, generalized anxiety/fear, noise phobia, impulse/control aggression, conspecific aggression, predatory aggression and obsessive-compulsive disorder (Overall et al. 2006). The fact that anxiety can have a genetic component is very important when looking at risk factors for separation anxiety. The tendency of some dogs to react badly to separation from the owner has been interpreted as a side effect of unconscious human selection for increasingly affectionate, socially-dependant and infantilized pets (Serpell and Jagoe 1995). People want a dog that is affectionate and tends to stay around them; they want a dog that is puppy-like and playful. Breeders want to breed the type of dogs that people want so a dog that is more affectionate will be bred in hopes that its offspring will have that trait. Breeding for these

affectionate traits may unfortunately be breeding dogs for separation and generalized anxiety problems.

According to the American Kennel Club's 2012 registration statistics, the most popular dog in the U.S. was the Labrador Retriever and the third most popular dog was the Golden Retriever. Many people consider both these breeds to be excellent companion dogs, because of their friendly and confident character (Kania-Gierdziewicz et al. 2013). They are also considered to be great for families with children (Kania-Gierdziewicz et al. 2013). In a study in Sweden, it was found that breeders of both Golden and Labrador Retrievers were breeding more for looks than for behavior traits, and this has lead to higher fearfulness among pet dogs in Sweden. Fear and anxiety are part of the same emotional spectrum closely related, so the breeding strategies practiced today may increase the risk of separation related behavior problems and impaired welfare of dogs (Rehn and Keeling 2011).

Another problem with breeding is that breeders breed for physical traits in dogs such as coat color. There have been studies on the genetic link between coat color and behavior problems. One example is the English Cocker Spaniel and aggression. Podberscek and Serpell found that solid color Cocker Spaniels tended to be more aggressive than particolors, suggesting a genetic basis for the difference (Podberscek and Serpell 1996). Sometimes when someone goes to a breeder to get a specific breed of dog they have certain physical traits in mind that they want the dog to have. An example would be for Labrador Retrievers, i.e. some people have a certain color they prefer and when they go to get a dog they will look for that particular color, rather than considering temperament as an issue of top priority. A compromised dog-human bond can develop

because of the mistakes in the breeding of dogs, such as that the breeders are selecting more for improving morphological characteristic rather than temperament traits of dogs (Valsecchi et al. 2010). When breeders breed for specific physical traits they do not necessarily consider the behavioral issues, if any, that may be linked with those particular physical traits.

Dogs with signs of separation anxiety have also been reported to frequently have signs of noise phobia or thunderstorm phobia (Overall et al. 2001). Storm phobia is defined as behavior indicative of fear in response to storms and storm related phenomena when they occur in isolation, e.g. rain, dark clouds in sky and wind (Crowell-Davis et al. 2003). The symptoms of storm phobia include panting, pacing, owner seeking, hiding, escape attempts from crates (or even the home itself), inappropriate elimination and vocalization (Cottam et al. 2012). Some of these symptoms are also symptoms of separation anxiety. These two behavior problems have often been seen in conjunction with each other (Flannigan and Dodman 2003).

When dogs that are fully socialized with humans are given the choice between interacting with another dog and a human, they often prefer social interaction and proximity with the human (Tuber et al. 1996). Kenneled dogs exposed to novel conditions had lower activity and glucocorticoid levels when in the company of their human caregiver than when with kennel mates (Tuber et al. 1996). This is why dogs are still observed to have separation anxiety when they have another dog with them at home (Parthasarathy and Crowell-Davis 2006). They are attached to the owner and are distressed because they cannot be close to the owner (Ibanez and Anzola 2009).

In Arhant et al.'s study of dog behavior, smaller dogs were rated by their owners as being more anxious and fearful (Arhant et al. 2010). Arhant stated that different training techniques could be the reason for this difference between large and small dogs.

Sleeping with the owner was thought to have an impact on incidence of separation anxiety based on a study done by Riva et al. 2008. Riva et al. found that 45% of anxious dogs slept on the bed or sofa with the owner (Riva et al. 2008). Sleeping with the owner may reinforce the dogs need to be with the owner constantly. This could lead to the dog not being able to be content when they are not with their owner.

Increasing exercise is sometimes used to decrease energy level as a treatment for separation anxiety in conjunction with medication or other behavioral training (Takeuchi et al. 2000). The hypothesis is that if the dog is not exercised enough they will have excess energy and might become destructive as a way to relieve their excess energy. This is an undesirable behavior that could lead to relinquishment to a shelter. If this is the case, the solution would be to exercise the dog in order to release that energy so the dog will not destroy property when the owner is gone. Another potential problem is time left alone. One study found that dogs experienced longer times of separation as more stressful or aversive than being separated for shorter times (Rehn and Keeling 2011). It could be that the dog becomes more stressed the longer the owner is away. This could happen because the dogs are not left alone as puppies, so they do not learn how to cope with being alone when they are older. Sometimes when people get a new puppy they feel bad about leaving the puppy alone and they take the puppy with them whenever they go somewhere or just don't go places when no one can stay home with the puppy. This can lead to problems in the future when the puppy gets older.

According to Mariti et al.'s study (2012) women were more able to identify the correct definition of stress and more frequently indicated that their dog's level of stress was medium than did men. This could mean that women are more able to observe the signs of anxiety and stress in their dogs than men. This difference could result in more women reporting signs of anxiety in their dogs than men. Such a difference does not necessarily mean that the dogs of women are more likely to have separation anxiety than the dogs of men, just that the female owners may be more likely to identify stress in their dogs then men. In two studies, male dogs had a higher probability of elevated levels of separation related disorder than females (McGreevy and Masters 2008, Martinez et al. 2011). More research needs to be done to determine if this is a consistent difference, or incidental to those two studies.

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CHAPTER 3

RISK FACTORS FOR SEPARATION ANXIETY IN DOGS

Introduction

Behavior problems are the number one reason cited by owners for surrendering their dogs to animal shelters. Each year, millions of unwanted dogs arrive in animal shelters after abandonment, abuse or relinquishment by their previous owners (Dowling-Guyer et al. 2001). Anxiety related behaviors are the second most commonly cited reason for surrenderment, the first being aggressive behavior. Inappropriate elimination, destruction of property and vocalization are the most obvious, and the most commonly reported, behaviors associated with separation anxiety (SA) in dogs (Overall et al. 2001). All three of these behaviors are commonly cited as reasons for relinquishment to shelters.

It is hypothesized that separation anxiety in dogs is proximately caused by over attachment to or over-dependency on the owner with concurrent underlying anxiety (Takeuchi 2000). Dogs with separation anxiety can be strongly attached to a person or have a strong desire to be with their owner. When this proximity is not possible, anxiety can ensue (Ibanez and Anzola 2009). This leads to unwanted or undesirable behaviors occurring, which can be detrimental to the owner-dog bond. If dogs start to display undesirable or unwanted behaviors, the owners are more likely to surrender the dogs to shelters or fosters.

Other theories on the causes of separation anxiety in dogs include: early separation from the mother, traumatic experiences when left alone, change in family circumstances

and genetic predisposition for separation anxiety (Flannigan and Dodman 2001). Traumatic experiences can include but are not limited to abuse, being relinquished to a shelter, the process of re-homing and changes to the household. Restrictive housing, such is common in shelters, has been found to be a stressor for dogs (Marston and Bennett 2003).

Adjusting to living in a shelter can be considered a traumatic experience for the dog. Changes in the household can also cause anxiety issues. Significant social changes in the homes such as a new family member or change in owner work schedule have been identified as a weak risk factor for separation anxiety (Neilson 2011). Changes in work schedule can cause change to the routine of the house which can in turn cause stress to the dog. The behavioral response to these changes may manifest as behaviors associated with separation anxiety. An example of this would be a dog tearing up a crate or the door that the owner departed out of in what is presumably an attempt to reunite with the owner.

Another change to the household can include the death of someone in or close to the household. Dogs may develop signs of emotional distress simply as a result of the absence of the individual that has died. Separation reactions may also be exacerbated by moods of their human caretakers who may be mourning the death of the same person or pet (Schwartz 2003).

Attachment relationships are a necessary component of living in a social group (Parthasarathy and Crowell-Davis 2006). Wolves, the closest relative to the dog, are a social species by nature. They live and travel together in packs (Jenks 2011, Hare et al. 2002).

People want dogs that are affectionate and seek companionship with us. Companion dogs that actively seek out interaction with their owner provide unconditional displays of affection, increase social interactions and cause measurable beneficial physiological, neurochemical and psychological changes (Marston and Bennett 2003). When people want a specific breed of dog, they may have specific traits in mind for that dog to have, e.g. some people want certain colors of Poodles or Labrador Retrievers. These people are looking for a physical trait and not necessarily looking for the specific behavioral traits that may be associated with breeding for a given color. Podberscek and Serpell (1996) found that solid color Cocker Spaniels tended to be more aggressive than particolors, suggesting a genetic basis for the difference. These dogs were being bred for this color trait and the behavior traits associated with that particular color were not being considered.

An estimated 17% of dogs in the United States suffer from separation anxiety. This equates to almost 10 million dogs. Less than a million of these dogs are receiving care for their separation anxiety (Neilson 2011). In 2008 Barbara Sherman stated that separation anxiety is diagnosed in about 20-40% of dogs that present to specialty behavior clinics in the US. Because separation anxiety is such a common problem more research needs to be done on the risk factors for separation anxiety and ways to correct the problem or prevent the problem from happening in the first place. Veterinarians need to be able to better educate clients on what separation anxiety is and how to deal with it to decrease the number of dogs surrendered to shelters each year. These risk factors can also help veterinarians give people advice before a family adopts or obtains a new pet.

In one study, dogs obtained from a shelter had a higher probability of separation anxiety than dogs obtained from sources such as breeders, pet stores, friends or family members (Neilson 2011). Tuber reports that about 20% of the populations of dogs in shelters are dogs that have been relinquished and then re-relinquished (Tuber et al. 1999). These dogs tend to have more problems coping once they enter a new home (Fuh et al. 2012). They can form new attachments to the owner, but may feel an increased sense of anxiety when the owner leaves each day. This can lead to more behavior problems and then a possible repetition of re-homing if the behaviors are not corrected.

Dogs with signs of separation anxiety have also been reported to frequently have signs of noise phobia or thunderstorm phobia (Overall et al. 2001). Storm phobia is defined as behavior indicative of fear in response to storms and storm related phenomena when they occur in isolation e.g. rain, dark clouds in sky and wind (Crowell-Davis et al. 2003). The symptoms of storm phobia include panting, pacing, owner seeking, hiding, attempts to escape from crates or even the home itself, inappropriate elimination and vocalization (Cottam et al. 2012). Some of these symptoms are also symptoms of separation anxiety. These two behavior problems have often been seen in conjunction with each other (Flannigan and Dodman 2003).

When dogs that are fully socialized with humans are given the choice between interacting with another dog and a human, dogs often prefer social interaction and proximity with the human (Tuber et al. 1996). Kenneled dogs exposed to novel conditions had lower activity and glucocorticoid levels when in the company of their human caregiver than when with kennel mates (Tuber et al. 1996). This may be why dogs are still observed to have separation anxiety when they have another dog with them

at home (Parthasarathy and Crowell-Davis 2006). They are attached to the owner and are distressed because they cannot be close to the owner (Ibanez and Anzola 2009).

Previous studies have shown that dogs acquired when older than 6 months of age are at increased risk of separation anxiety, with the greatest risk of relinquishment occurring when the dogs are initially acquired when aged 1-2 years (Marston and Bennett 2003). Older dogs also more often come from shelters, instead of breeders or pet shops (Martinez et al. 2011). Older dogs may not have been properly socialized as puppies if they were in shelters, and are subsequently not able to cope with novel situations. This would make older dogs more prone to separation anxiety induced behaviors.

In Arhant et al.'s study of dog behavior, smaller dogs were rated by their owners as being more anxious and fearful (Arhant et al. 2010). Arhant stated that different training techniques could be the reason for this difference between large and small dogs.

Sleeping with the owner was thought to have an impact on incidence of separation anxiety, based on a study done by Riva et al. 2008. Riva et al. found that 45% of anxious dogs slept on the bed or sofa with the owner (Riva et al. 2008). Sleeping with the owner may reinforce the dogs need to be with the owner constantly. This could lead to the dog not being able to be content when they are not with their owner.

According to Mariti et al.'s study (2012) women were more able to identify the correct definition of stress and more frequently indicated that their dog's level of stress was medium. This could mean that women are more able to observe the signs of anxiety and stress in their dogs then men. This difference could result in that more women reporting signs of anxiety in their dogs than men. Such a difference does not necessarily mean that the dogs have separation anxiety, just that the female owners may be more

likely to identify stress in their dogs then men. In two studies, male dogs had a higher probability of elevated levels of separation related disorder than females (McGreevy and Masters 2008, Martinez et al. 2011). More research needs to be done to determine if this is a consistent difference, or incidental to those two studies.

Increasing exercise is sometimes used to decrease energy level as a treatment for separation anxiety in conjunction with medication or other behavioral training (Takeuchi et al. 2000). The hypothesis is that if the dog is not exercised enough they will have excess energy and might become destructive as a way to relieve their excess energy. This is an undesirable behavior that could lead to relinquishment to a shelter. Another potential problem is time left alone. One study found that dogs experienced longer times of separation as more stressful or aversive than shorter times of separation (Rehn and Keeling 2011). It could be that the dog becomes more distressed the longer the owner is away. This could happen because the dogs are not left alone as puppies, so they do not learn how to cope with being alone when they are older

In this study we hypothesized about the effect of 12 specific risk factors for separation anxiety:

1. **Source of dog:** Our primary hypothesis was that dogs obtained from shelters would have a higher incidence of separation anxiety than dogs obtained from breeders or pet stores.
2. **Storm phobia:** Dogs that have separation anxiety will have a higher incidence of storm phobia.

3. **Type of dog (mixed, predominantly one breed or pure breed):** Mixed breed dogs would have a higher rate of separation anxiety than pure breed dogs.
4. **Another pet in the house:** If there was another dog in the household then the incidence of separation anxiety would not be affected.
5. **Age of dog when obtained:** Dogs obtained at an older age would have a higher incidence of separation anxiety than dogs obtained at a young age.
6. **Weight of dog:** Smaller dogs would have a higher incidence of separation anxiety than large dogs.
7. **Sex of the dog:** Male dogs would have a higher incidence of separation anxiety than female dogs
8. **Sex of the owners:** Female dog owners would be more likely to have a dog with separation anxiety based on criteria used in the study.
9. **Sleeping with the owner**: If a dog slept in the bed with the owner it would be more likely to have separation anxiety than dogs that sleep elsewhere in the house.
10. **Time left alone:** The more time the dog spends alone the higher the chance the dog will have separation anxiety.
11. **Time spent exercising the dog:** The less time spent exercising the dog the more likely the dog will have separation anxiety.
12. **Changes to the household**: If there are changes to the household the dog is more likely to have separation anxiety.

Materials and Methods

Subjects

There were 202 dogs included in this study. The subjects were recruited from two veterinary facilities in Athens Georgia. All dog owners that came into the two facilities were asked if they would like to participate in a study about canine anxiety. If they answered yes then they were handed a survey to fill out. If they owned more than one dog they were given the option to fill out multiple surveys. The owners were allowed to take the survey home and bring it back later if they needed additional time to complete it. Dogs did not have to have anxiety to participate in the study. The survey was completely based on owner's perceptions of their dog's behavior.

Survey

A 22 question survey was circulated through 3 clinics in Athens Georgia: Companion Animal Hospital, Community Practice Clinic at the University of Georgia, and the Behavior Service at University of Georgia. This two page survey included questions about source of dog, dog behaviors when the owner is away, household alterations, time left alone and time exercised. The surveys were circulated through each clinic from June 1st, 2012 through January 22nd, 2013 during which time 203 surveys were collected in total. One survey was discarded because the owner failed to answer over half of the questions. A copy of the survey is included in Appendix A.

For the purposes of this study a dog was considered to have separation anxiety if the owner answered yes to two out of four questions about separation anxiety. The questions determining separation anxiety were: Does your dog present any of the

following behaviors: 1) Destructive behavior when you or anyone else in the home leaves or is gone? 2) Inappropriate elimination when you or someone else in the house leaves (in an otherwise house trained dog)? 3) Does your dog vocalize excessively when you or anyone else in the house leaves? 4) Does your dog show any other sort of anxiety when you are preparing to leave the house? If yes explain. Three of the four questions above (inappropriate elimination, vocalization and destructiveness) had a Likert scale for the owner to rate the severity of the symptoms on a scale of 1-5, where 1 equaled mild and 5 equaled severe. A score of zero was assigned to all of the behaviors the dog did not exhibit. Since there were 4 behaviors listed that could be indicative of separation anxiety the severity scale went from 0 to 15.

Twelve potential risk factors for Separation Anxiety were assessed.

1. Source of dog

Owners were given eight choices of where they obtained their dog. These sources included foster, small breeder (2 or less females), large breeder (3 or more females), shelter, humane society, pet store, stray (found the dog) or other. Beside the choice "other" was a space to indicate where the dog was obtained. A breeder was defined as anyone owning an intact female whether or not breeding was intentional. This was written on the survey so that the owners could select the correct choice.

2. Dog's age when obtained by owner:

Owners were asked to give the best estimate of how old the dog was when he or she was obtained. The ages were given as a range because not all owners know the exact age of a dog when they acquire them. The ranges were listed as: less than 3 months, 3-6 months, 6-12 months, 1-3 years, 4-6 years and 7+ years.

3. Altered households:

This question was divided up into three separate questions: 1) Have you moved since obtaining your dog? 2) Have there been any new additions to the family (e.g. a new baby, new marriage)? 3) Have there been any losses in the household (e.g. death of a family member, loss of a pet, divorce)? All questions were asked as yes or no questions and if the owner answered yes then they were asked to explain.

4. Time left alone:

Owners were asked to estimate how many hours per day on average they left their dog alone for each day of the week. A table was provided for the owner to write in the number of hours per day the dog was left alone on average.

5. Sleeping with owner:

The owners were asked if the dog slept with them or someone else in the household (yes or no). If the owner answered no then they were asked to state where the dog slept.

6. Breed of dog:

The owners were given three options when talking about the breed of dog they had: 1) Mixed 2) Predominantly one breed 3) Pure breed (have papers or could have obtained papers). There was also space for the owners to write out what breed of dog they obtained next to the predominantly one breed and pure breed answer choice.

7. Sex of the dog:

Sex of the dog was asked as simply male or female. Not enough intact males were surveyed to statistically assess the question of possible effect of being intact vs. neutered.

8. Sex of owner:

Gender of the owner was asked as male or female.

9. Exercise time:

Owners were asked how many hours per day on average they spent exercising their dog. They were given a chart similar to the one used for time left alone per day.

10. Weight of dog:

Owners were to write down their best estimate of the dog's current weight.

11. Another pet in the household:

Owners were asked if there was another pet in the house hold (yes or no).

12. Storm phobia:

Owners were asked if their dog presented any of the following behaviors during thunderstorms: pacing, panting excessively or trembling (yes or no). They were also given the option to write in any other behavior indicative of anxiety that occurred during storms, if present. If the owner wrote in a behavior in the "other" section it was considered a yes answer. A dog was considered to have storm phobia if yes was answered for any of the four choices.

Exclusion Criteria:

People coming in with new dogs were excluded from the study because the owner had not had the dog long enough to fill out a survey on the dog's behavior.

Data analysis:

All data were analyzed using SAS V 9.2. A simple logistic regression was performed to test for relationships between various risk factors and the probability of SA. These risk factors included: storm phobia, altered household, sleeping with owner and another dog in the household. Analysis of variance or student's t-tests were used to compare SA severity between categorical risk factor groups. These risk factors included: Sex of dog, sex of owner, type of dog and source of dog. A Pearson's correlation was used to test for correlations between SA severity and continuous risk factors. These risk factors included: Age, weight, time left alone and exercise. All hypothesis tests were 2-sided and the significance level was $P \leq 0.05$.

In the survey owners were asked to rate the severity of the dog's anxiety, if any, on a scale of 1-5. If the owner answered that the dog did not display a behavior then a score of zero was given for this question. The four scores were added together and this number was the severity score. The severity score ranged from 0-20.

Results

Of the owners that completed the survey, 148 were male and 49 were female. There were 88 female dogs and 113 male dogs included in this study. Based on the criteria defined for this study 63 dogs were considered to have separation anxiety and 139 dogs were considered not to have separation anxiety. Source of dog had a significant effect on the incidence of separation anxiety ($P = 0.0024$) in these dogs. Dogs obtained from a foster showed the highest incidence of separation anxiety at 62.5%. Pet stores and large breeders followed with 52.9% and 47.6% respectively. Dogs obtained as strays had

the lowest incidence of separation anxiety at 10.5%. Fig.1 shows the percentage of separation anxiety for all eight sources.

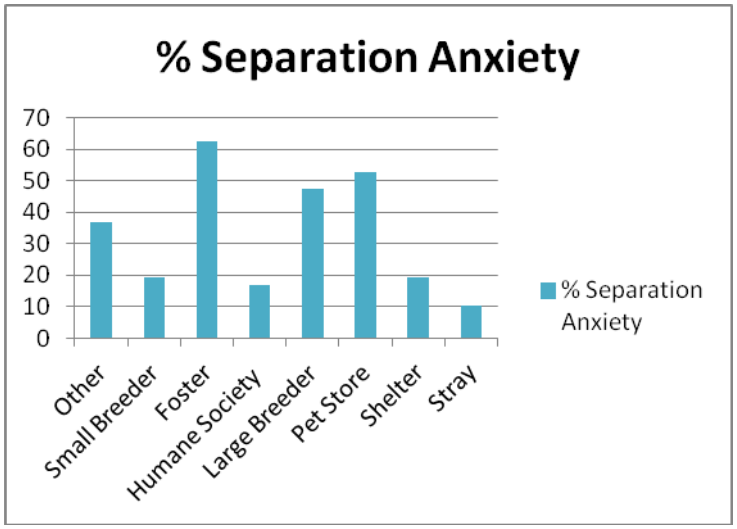

Figure 1: Percentage of dogs with Separation Anxiety by source of dog

An odds ratio was used to see how likely a dog is to have separation anxiety based on the source of the dog. Table.1 shows the 11 significant odds ratios for source of dog. Dogs from a foster were 7 times more likely to have separation anxiety than dogs from a shelter or small breeder. Dogs from a pet store were 4.7 times more likely to have separation anxiety than dogs from shelters. Dogs from large breeders were 3.8 times more likely to have separation anxiety than dogs from shelters.

Sources Compared	**Odds Ratio (95% CI)**
Foster vs. Shelter	7.0 (1.2-39.6)
Foster vs. Small Breeder	7.0 (1.4-34.3)
Foster vs. Humane Society	8.3 (1.0-67.1)
Foster vs. Stray	14.2 (1.8-109.9)

Pet Store vs. Shelter	4.7 (1.4-15.5)
Pet Store vs. Small Breeder	4.7 (1.8-12.4)
Pet Store vs. Humane Society	5.6 (1.1-29.6)
Pet Store vs. Stray	9.6 (1.9-48.0)
Large Breeder vs. Shelter	3.8 (1.0-13.9)
Large Breeder vs. Small Breeder	3.8 (1.3-11.5)
Large Breeder vs. Stray	7.7 (1.4-42.2)

Table 1: Significant odds ratios by source

Figure 2 shows the score for severity of separation anxiety for each of the eight sources from which the dogs were obtained. The severity of separation anxiety was significant between the sources (P= 0.0055). The source with the highest severity score was pet stores (3.1) followed by large breeder (2.5). The source that scored lowest in severity was humane societies (0.6).

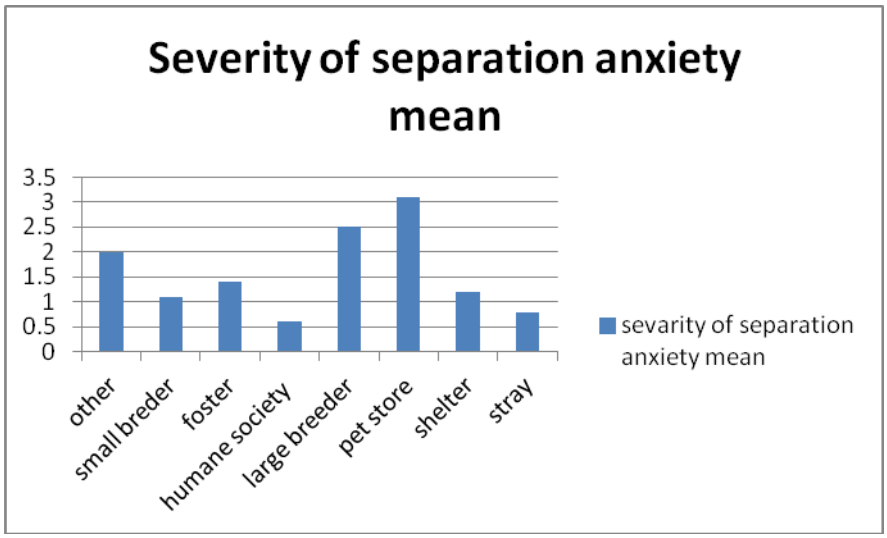

Figure 2: Scores for severity of separation anxiety by source of dog

Since the age question was asked as a range the midpoint of each range was used for analysis. The mean age at which the dogs were obtained was 0.87191 years which is about 10 months old. Age when obtained had no significant effect on prevalence of separation anxiety (P= 0.0780). Alterations to the household, as a whole, were not found to be a significant risk factor for separation anxiety (P= 0.9023). When the three questions were looked at individually they were still found to be insignificant (moving P= 0.7121, new additions P= 0.1321, and losses P= 0.6028). Four people failed to answer the question about new additions to the household.

Time left alone and time spent exercising per day did not have a significant effect on incidence of separation anxiety (P= 0.0761 and P= 0.2050 respectively). Many people failed to answer these questions on the survey (15 and 25 people respectively). Sleeping with the owner did not have a significant effect on separation anxiety (P= 0.4608), nor did the presence of other pets in the household (P= 0.9696). Sex of dog was not found to have a significant effect on incidence of separation anxiety (P= 0.1148). One person failed to answer this question. Gender of the owner was not found to have a significant effect on incidence of separation anxiety (P= 0.3611). Five people failed to answer this question. The weight of the dog did not have a significant effect on the incidence of separation anxiety (P= 0.7818). Five people did not fill out this question on the survey.

There were 62 mix breed dogs, 39 predominantly one breed and 100 pure breed dogs in this study. There was a significant effect of mixed vs. pure breed on the incidence of separation anxiety (P = 0.0109). The percentage of separation anxiety for each type of dog is shown in figure 3. Pure bred dogs had the highest rate of separation anxiety, with 41% of pure breed dogs being identified as having SA. Dogs that the

owners identified as predominantly one breed had the second highest rate at 28.2%. Mix breed dogs had the lowest rate, at 17.7%. When each type of dog was examined against the other a significant difference was found between pure breed dogs and mix breed dogs, pure breed dogs having the higher occurrence of separation anxiety (P= 0.0253). Pure breed dogs also had a higher severity score than mixed breed dogs (2.42 and 1.00 respectively) and were 3 times more likely to have separation anxiety than mixed breed dogs. Only one person failed to answer this question.

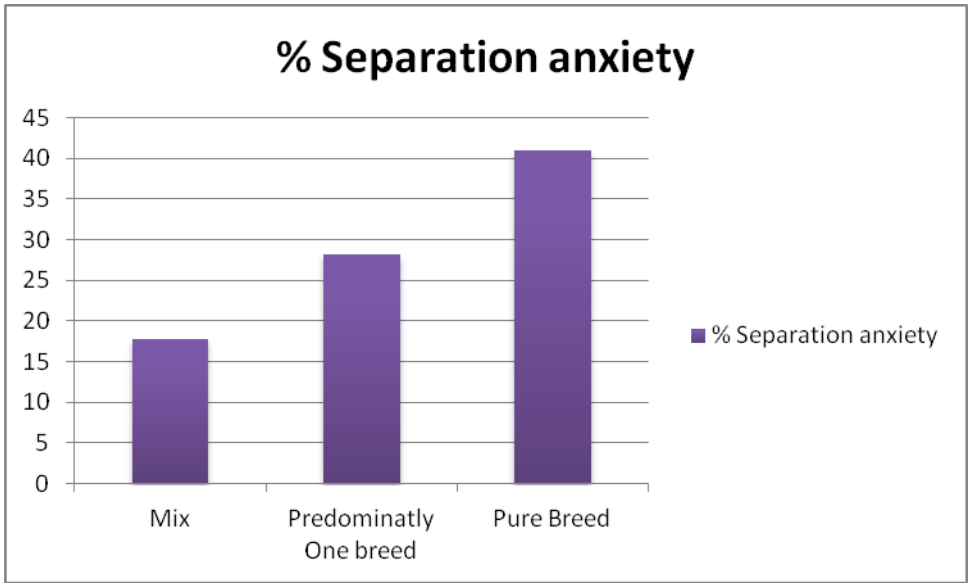

Figure 3: Percentage of dogs of a given breed with Separation anxiety by type of dog

A simple logistic regression was run to compare the effects of having storm phobia on the odds of separation anxiety. There was a significant inverse relationship between storm phobia and separation anxiety (P= 0.0075). Of the dogs with separation anxiety 71.43% did not have storm phobia and 28.57% of dogs with separation anxiety did have storm phobia. The odds of having separation anxiety were 2.4 times higher in dogs without storm phobia than dogs with storm phobia. Figure 4 shows the number of dogs with separation anxiety and storm phobia based on yes or no answers. Figure 5 shows

the number of dogs with separation anxiety, storm phobia, both storm phobia and separation anxiety, and dogs that don't have either.

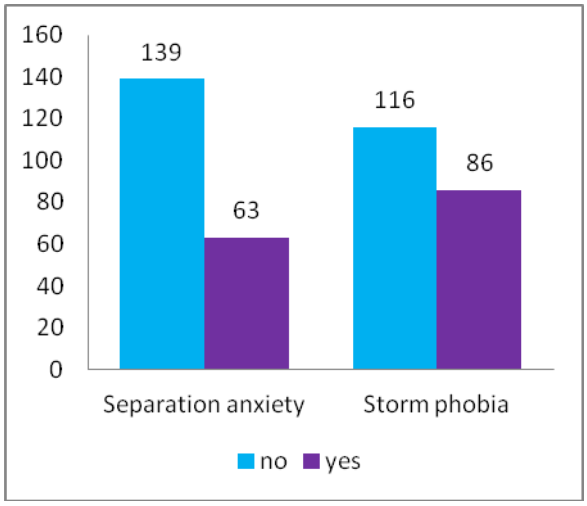

Figure 4: Separation anxiety vs. Storm phobia

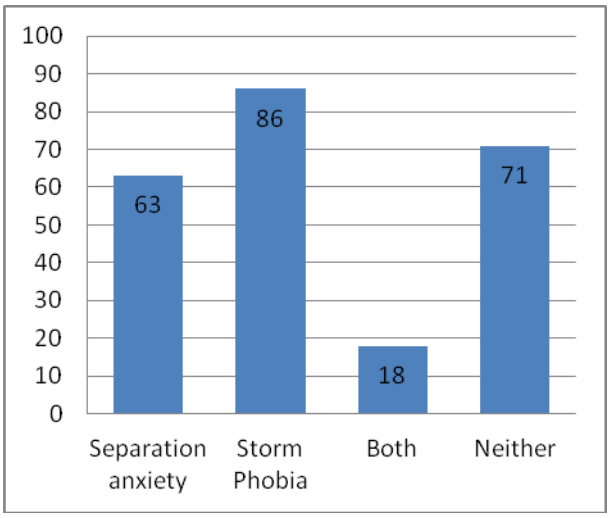

Figure 5: SA vs. Strom Phobia by category

Discussion

This study looked at 12 different factors commonly associated with dogs presenting with separation anxiety. Our main hypothesis was that dogs obtained from shelters would have a higher incidence of separation anxiety than dogs obtained from breeders (large or small). The hypothesis was not supported by this study. This was surprising based on the other literature published to date. Dogs obtained from shelters ranked fifth (tied with small breeders) on the list of sources, based on incidence of separation anxiety. Dogs obtained from fosters had the highest incidence of separation anxiety, followed by pet stores and large breeders.

Dogs from foster environments have often been moved around from place to place and have probably developed an attachment to people at each place. The people that the dogs are attached to are no longer around, which can cause stress to the dog and they may not know how to cope with their new environment. Valsecchi et al. (2010) found that pet dogs that experienced abandonment in a rescue shelter and were then adopted were still able to form an attachment bond with the new owner but tended to be more anxious and less secure when tested in the strange situation test. Valsecchi was talking more about dogs obtained from shelters but the same theory can be applied to dogs from fosters. These dogs may have been moved around numerous times before the current owner obtained the dog. The dogs may have lived in a home, then been taken to a shelter, then been given to a foster group and finally went to the current owner. Marston and Bennett (2003) report that unusually high incidence of post-adoption separation-related problems result from the loss of a primary attachment figure and speculate that such animals are more likely to develop insecure attachments to subsequent owners.

Pet stores obtain their dogs from breeders, so it is not surprising that these two sources would rank next to each other for incidence of separation anxiety. One issue that could explain the fact that dogs from large breeders have a higher incidence of separation anxiety is genetics. Studies have shown a link between anxiety- related behaviors and genetics. The tendency for some dogs to react badly to separation from the owner has been interpreted as a side-effect of unconscious human selection for increasingly affectionate, socially dependent and infantilized pets (Serpell and Jagoe 1995). People want dogs that want to be with them and want more companionship. Selecting for these traits may inadvertently be breeding for more anxious dogs as well. This could be a reason that both pet stores and large breeders have a higher incidence of separation anxiety than other sources listed. Small breeders in this study included people breeding on purpose and those who had a dog that got pregnant by accident. This could be part of the reason that small breeders ranked lower than large breeders. People that have a dog that gets pregnant accidentally are not breeding for certain desirable traits.

We found pure breed dogs to have a higher incidence of separation anxiety than mixed breed and predominantly one breed dogs. This is consistent with the ranking of source, since more pure breed dogs are found in pet stores and large breeders. There could be a number of reasons for this: one being, as stated above, the genetic component. We have bred dogs to be more sociable. People want dogs that want to be around them, cuddle with them, and be friendly. In a comparative study about attachment in wolves and dogs, wolves were found to have little to no attachment to humans even after extensive socialization periods, whereas pet dogs were shown to have great attachment (Topal et al. 2005).

According to Serpell and Jagoe (1995), puppies from pet stores are often the result of mass production in so–called puppy-mills with little regard for their temperamental characteristics. Such animals may also undergo inadequate early socialization and a range of abnormal or traumatic early experiences that could predispose them to develop inappropriate adult behavior (Serpell and Jagoe 1995). Puppies that spend a lot of time in the pet store and are purchased at an older age may have a harder time adjusting to their new home and forming appropriate attachment bonds with the new owners.

We predicted that more dogs obtained at an older age would come from shelter/stray environments than from breeders or pet stores and that, as a consequence, dogs obtained at an older age would have a higher rate of separation anxiety (Martinez et al. 2011). Age when obtained was not found to have a significant effect on the incidence of separation anxiety in this study.

A possible explanation for the lack of difference may be found in the fact that pet stores and large breeders had a higher incidence of separation anxiety than expected. It would have also make sense for dogs obtained at a younger age to have a higher incidence of separation anxiety based on the fact that they may have been taken from the mother before six to eight weeks of age. This can cause puppies to develop insufficient coping mechanisms with novel environments and experiences (Serpell and Jagoe 1995). This could happen in the large breeder and pet store situations because some of the puppies may be taken from their mother and litter mates too early, so they can be sold earlier. This can happen with small breeders as well.

Tuber et al. (1996) found that the presence of a human caretaker significantly reduced the glucocorticoid response of dogs in a novel environment more than the presence of another kennel mate in the same environment. Some people think that if they get another dog their anxious dog will feel better and not be as anxious. Getting another dog to help with separation anxiety usually does not work because the dog is anxious because the owner is gone, not because it is alone. In one study, measures of stress were unaffected by a kennel mate's presence or absence; however, stress was reduced by the presence of a human caregiver (Schwartz 2003). This shows that having a human companion may be more important and beneficial to the dog than having another dog companion in the household.

Storm phobia is defined as behavior indicative of fear in response to storms and storm-related phenomena when they occur in isolation, e.g. rain, dark clouds in the sky and wind. Fear of other storm-related phenomena such as changes in barometric pressure or the sounds of wind, with or without thunder is common (Crowell-Davis et al. 2003). In this study a dog was considered to have storm phobia if they did any one of the following behaviors during a storm: pacing, panting excessively, trembling or any other anxious behavior. General symptoms of storm phobia include panting, pacing, owner seeking, hiding, attempts to escape from crates, or even the home itself, inappropriate elimination and vocalization (Cottam et al. 2012). The predicted outcome was that the presence of separation anxiety would increase the incidence of storm phobia. This hypothesis was not supported. In fact, the opposite was true in this population. There was a higher chance of the dog having storm phobia if they did not have separation anxiety than if they did have separation anxiety. According to Flannigan and Dodman (2003)

there are contradicting studies about the relationship between separation anxiety and storm phobia, with some studies not finding an association between separation anxiety and thunderstorm phobia while others studies do find a relationship between the two.

Alterations to the household were not found to have an effect on separation anxiety in this study. We thought that if someone moved around a lot or there were additions and/or losses to the household then these things would have an impact on the dog. In a study done by McGreevy and Masters, dogs were more likely to exhibit high separation related disorder scores if they lived in a household that had acquired a new household member or in which a member of the household had changed jobs (McGreevy and Masters 2008). However, the findings of this study were not consistent with McGreevy and Masters. This could be because the owners did not perceive their dog to have an anxiety problem when it did. Another possibility could be that some of these dogs could be more adaptable to novel situations such as a new house or new additions to the family.

It was expected that dogs that were left alone for longer periods of time during the week would have a higher incidence of separation anxiety than those that were not left as long. This hypothesis was not supported in this study. In fact, time left alone had no effect on incidence of separation anxiety.

We also expected that dogs that were not exercised much during the week would have a higher incidence of separation anxiety than those dogs that were exercised more during the week. Dogs that are not exercised enough may have excess energy. This can lead to destruction while the owner is away. Exercise has been used as one treatment for

separation anxiety, usually in conjunction with behavioral modification. However, this study did not identify any relationship between amount of exercise and presence of SA.

Based on a study by Riva et al. (2008) sleeping with the owner was expected to have an impact on incidence of separation anxiety. Riva et al found that 45% of anxious dogs slept on the bed or sofa with the owner. However, the data in this study were not consistent with the data in Riva's study.

According to Mariti et al.'s study, women were more able to identify the correct definition of stress and more frequently indicated that their dog's level of stress was medium (Mariti et al. 2012). We thought that females would report more cases of separation anxiety in their dogs than males based on sex differences in perception of anxiety. The sex of the owner did not have a significant effect on the incidence of reporting of behaviors consistent with separation anxiety.

In another study male dogs have been found to be at higher risk for behavior problems than female dogs (Martinez et al. 2011). In a study done by McGreevy and Masters, male dogs had a higher probability of elevated levels of separation related disorder than females (McGreevy and Masters 2008). Sex of the dog did not have an effect on incidence of separation anxiety in this study.

Weight of the dog had no effect on separation anxiety in this study. The dogs' weight was not broken down in to groups, but was examined to see if there was a correlation between severity of separation anxiety and increasing weight of the dog. In Arhant et al.'s study, smaller dogs were rated by their owners as being more anxious and fearful (Arhant et al. 2010). Arhant also stated that different training techniques could be

the reason for this difference between large and small dogs. There was no significant difference between the small and large dogs in this study.

Conclusions:

There are many risk factors for separation anxiety and they should be studied further so that fewer dogs are surrendered to shelters and humane societies for this problem. Source of dog and type of dog were found to have an impact on incidence of separation anxiety in the dogs in this study. Learning about the risk factors for separation anxiety may help us to find ways to treat dogs that already have this problem and could possibly help to prevent the problem from developing in some cases.

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Appendix A: Risk factor survey

1. Are you Male or Female?
2. Sex of dog: male female
3. Is your dog spayed/neutered: Yes No
4. What is your best estimate of how old your dog was when you obtained him/her: less than 3 months 3-6 months 6 months-12 months 1 yr- 3 yrs 4yrs -6yrs 7+ years
5. What is your best estimate of how old your dog is now? less than 3 months 3-6 months 6 months-12 months 1 yr- 3 yrs 4yrs -6yrs 7+ years
6. Where did you obtain your dog: Shelter Humane Society Pet store Large Breeder*(3 or more females) Small Breeder* (2 or less females) Stray (found the dog) Foster other :_____

   *a breeder is anyone owning an intact female whether or not breeding was intentional.
7. How many previous owners has the dog had?_____ or unknown
8. Why did you obtain your dog? _____
9. What breed of dog did you get? 1) Mix

   2) Predominantly one breed _____

   3) Is pure breed (have papers or could have obtained papers

   _____
10. How much (approximately) does your dog weigh? _____
11. Does your dog present any of the following behaviors: 1=mild 5=severe

- Destructive behavior when you or anyone else in the home leaves or is gone: Yes No

  If yes 1 2 3 4 5

  If yes explain destructive behavior:-

  _____

- Destructive behavior when you are home: yes No

  If yes explain:

  _____

- Inappropriate elimination when you or someone else in the house leaves (in an otherwise house trained dog) Yes No

  If yes 1 2 3 4 5

- Does your dog vocalize excessively when you or anyone else in the house leaves? Yes NO

  If yes 1 2 3 4 5

- Does your dog show any other sort of anxiety when you are preparing to leave the house? Yes No If yes explain:

  _____

- When someone is home how much time does dog spend in close proximity: (circle one) A). 0 (none) B). 20% C). 40% D). 60% E). 80% F). 100%

11b .When did the problem behavior(s) begin: within the 1st 8weeks or after the 1st 8 weeks (circle one)

How many hours a day is you dog left alone on average:

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

12. How many hours a day are spent exercising/ playing with the dog?

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
# hours on average							
Type of exercise*							

*Types of exercise: short walk (less than 2 miles), long walk (longer than 2 miles), Run, Go to the park, Play ball. Etc.

13. Where is the dog left when alone (Circle all that apply): crated, confined to one room, free reign of house, confined to a section of the house, outside in a fenced yard, Other_____

14. Is there another pet in the house?

    a. If yes how many and what are they?

       _____

    b. Does your dog seem to be socially attached to other pet(s)?

    c. How much time do they spend close together when you are home?

15. How does your dog react when you come home: Circle all that apply) Vocalizes, Urinates, Ignores you, greets you excitedly (jumping, etc.), greets you calmly, other:_____

16. How does your dog act during thunderstorms:

    a. Pacing: Yes No

    b. Panting excessively: Yes No

    c. Trembling: Yes No

    d. Other-If other explain:

    _____

17. Have you moved since obtaining your dog: Yes No

    a. If yes how many times:_____

18. Have there been any new additions to the family (i.e. an new baby , new marriage, etc) Yes No

    a. If yes

    specify:_____

19. Have there been any losses in the household (death of a family member, loss of a pet, divorce, etc.) Yes No

    a. If yes Specify:

    _____

20. Is your dog allowed inside or only outside?

    _____

21. Does the dog sleep in the bed with you or anyone else in the house? Yes No

a. If yes specify:

_____

b. If no where does dog sleep?

_____

22. Do you leave food out when you leave for the day? Yes No

a. If yes does the dog eat when you are gone? Yes No

If not does he eat when you get home? Yes No